

ON THE PARASITIC ACARI FOUND ON THE SPECIES OF RODENTS FREQUENTING HUMAN HABITATIONS IN EGYPT.

By STANLEY HIRST.

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The Acari dealt with in this paper were collected by Dr. G. F. Petrie during his plague investigations in Egypt. My best thanks are due to him and also to the authorities of the Lister Institute for their kindness in permitting me to examine this collection.

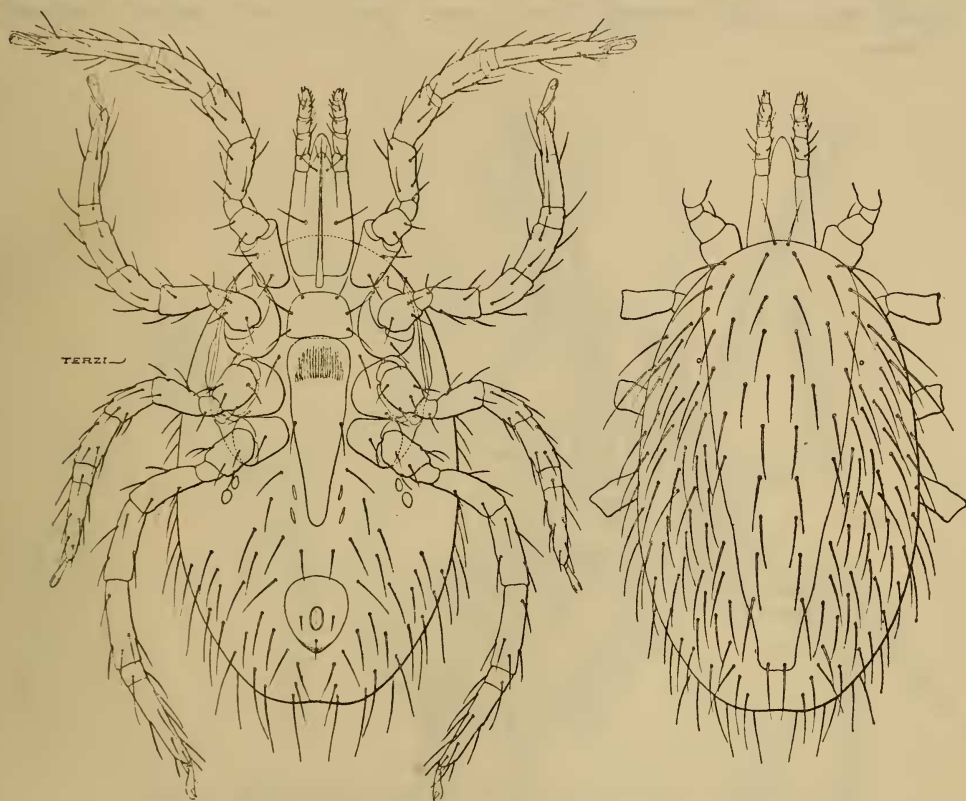


Fig. 1. *Dermanyssus muris*, Hirst, ♀; ventral and dorsal aspects.

The species are few in number, but several of them are represented by very numerous specimens, including developmental stages of considerable importance. Three of them (*Dermanyssus muris*, *Leignathus bacoti*, and *Laelaps echidninus*) are very widely distributed forms and it seems probable that rats (*Mus rattus* and *M. norvegicus*) are their principal hosts. *L. bacoti* is of exceptional interest, owing to the fact that it readily attacks man.

Family GAMASIDAE.

I. *Dermanyssus muris*, Hirst (figs. 1-4).

Dermanyssus (Liponyssoides) muris, Hirst, Bull. Ent. Res. iv, pp. 120-122, text-figs. 1 and 2 (1913).

♀. *Dorsal shield* and *anal plate* shaped very like those of *D. gallinae*, Redi, but the shield has long hairs on its surface instead of short ones. *Sternal plate* trapezoidal in shape and furnished with three pairs of long fine hairs. *Genito-ventral plate* much narrower, especially posteriorly, than is the case in *D. gallinae*; on either side of and parallel with this plate, there are two very narrow (linear) platelets, which are not very easy to see. A pair of little oval platelets are also present behind each of the fourth coxae. *Peritreme* long, seemingly extending as far forwards as or slightly beyond the coxa of the second leg. Anterior surface of coxa of *second leg* armed dorsally with a sharp forwardly directed spur. *Length* of body (gorged specimen), 1.87 mm.

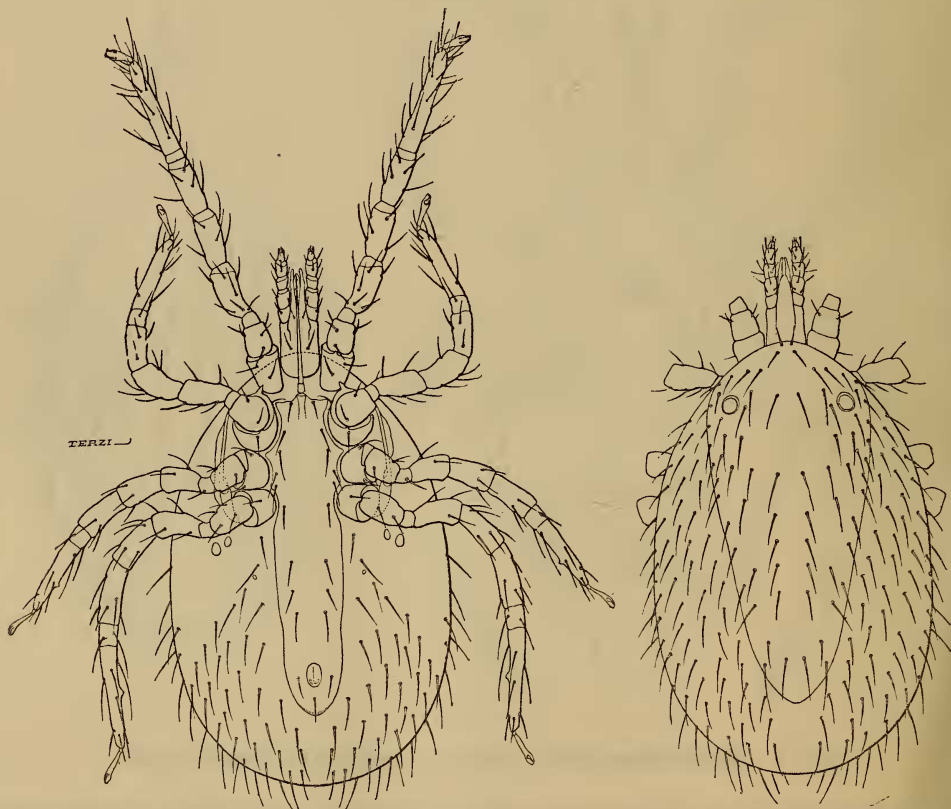


Fig. 2. *Dermanyssus muris*, Hirst, ♂; ventral and dorsal aspects.

♂. *Dorsal shield* long and fairly wide, the posterior end being rounded (occasionally somewhat angular) instead of subtruncate as in the female; at some distance from the anterior end of this shield, there is a pair of rather large eye-like organs on its surface and they are widely separated from one another, being placed close to the

lateral margins. *Sterno-ventral plate* practically uniform in width posteriorly, the sides being almost straight; it bears ten pairs of hairs and a single unpaired posterior hair on its surface. Behind each of the coxae of the last pair of legs there is a pair of platelets. *Peritreme* very long, apparently extending beyond the first coxa. *Chelicera* fairly long; apparently the digits are fused together and they are accompanied by a free slender process or flagellum, which is as long as the digits themselves and furnished with a sharp little tooth. *Legs*. Anterior surface of coxa of second leg armed with a tooth as in the female. Tarsi of third and fourth legs long and slender; there is a little conical protuberance near the middle of the ventral surface of the distal part of these tarsi.

Length of body, .95 mm.

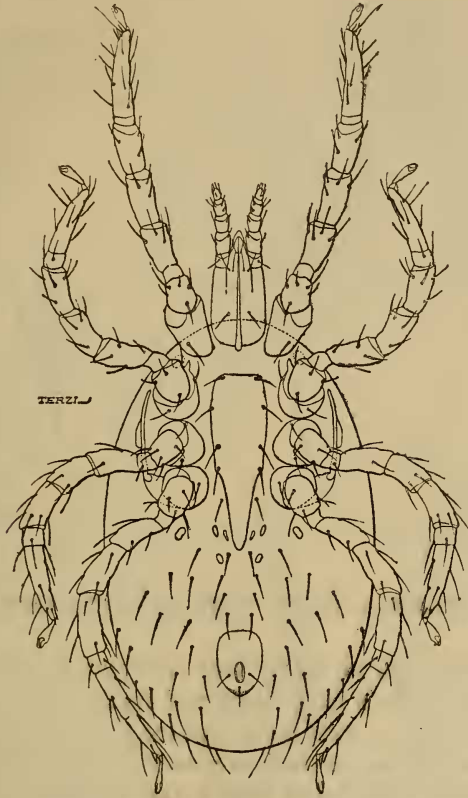


Fig. 3. *Dermanyssus muris*, Hirst; ventral view of deutonymph.

Deutonymph.* *Dorsal shield* closely resembling that of the female. On the side of the body above the proximal segments of the second leg there is a small but distinct oval plate. *Sternal plate* long; its posterior end is bluntly pointed and projects well beyond the last coxae, four (sometimes five?) pairs of hairs are present on it; on each side of the posterior end of this plate, there are three minute platelets, but they are inconspicuous. A distinct bilobed platelet is also present

* The deutonymph described above, and also those of the two other species of *Dermanyssus* described in this report, are probably females.

behind each of the coxae of the last pair of legs. *Peritreme* extending forwards as far as the middle of the second coxa or slightly further. Anterior surface of coxa of second leg with a well-developed spur as in the adult female. *Length* of body, 1 mm.

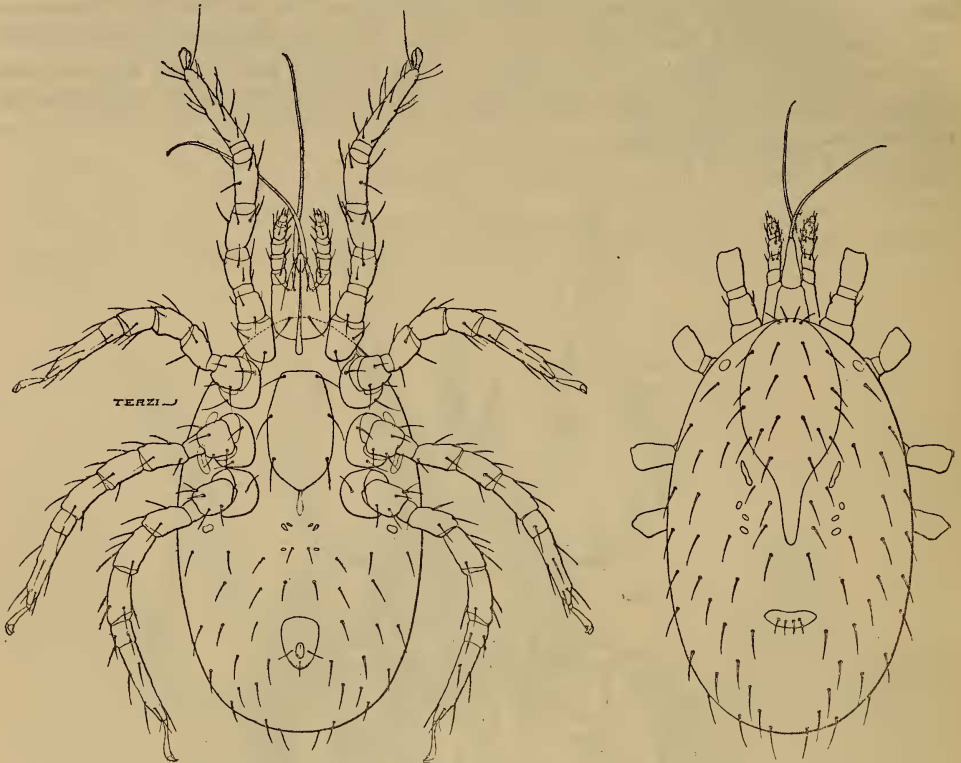


Fig. 4. *Dermanyssus muris*, Hirst; ventral and dorsal aspects of protonymph.

Protonymph. Principal *dorsal shield* very different in shape from that of the female and deutonymph. It is fairly large and rather wide, but has a narrow tail-like prolongation posteriorly; hairs on its surface long, fine and not very numerous. Four minute and inconspicuous *platelets* are present on each side of the tail-like portion of it, those of the anterior pair being narrow and elongated, but those of the other three pairs much smaller and oval in shape. A rather small but distinct *posterior dorsal shield*, which is transversely elongated and somewhat recurved, is also present and bears 2-4 hairs. A little subcircular platelet is situated on the side of the body above the interval between the first and second legs and another very similar, but almost ovate, platelet is situated slightly in advance of the anterior end of the *peritreme*. *Sternal plate* fairly wide and reaching backwards to about the middle of the last coxae; it has three pairs of long fine hairs on it. There are three pairs of very minute and inconspicuous platelets posterior to the sternal plate and a distinct bilobed platelet behind each of the last coxae. *Peritreme* very short. Anterior surface of coxa of second leg armed with a small but distinct spur. *Length* of body, .72 mm.

The female, male and protonymph are described from both Oriental and Egyptian specimens, but the account of the deutonymph is based entirely on Egyptian material.

EGYPT: Assiût, specimens were on the following hosts:—(1) Several hundred specimens from *Mus rattus*, both in the town and on the feluccas; (2) one specimen found on *Mus norvegicus*; (3) a few specimens from *Arvicanthis niloticus* (in houses). Kous; a few specimens found on *Mus rattus* and one on *Acomys*. El Hasaiba, Deirût; seven specimens found on *Mus rattus*.

ARABIA: Sheik Othman; one specimen on a rat (species not determined) collected by Dr. Macrae and now in the collection of Mr. James Waterston.

INDIA: Madras, on *Mus rattus*.

CEYLON: Colombo, on *Mus rattus*.

2. *Dermanyssus sanguineus*, sp. nov. (figs. 5–8).

♀. Dorsal surface with two distinct *shields*, the posterior one being of small size. *Anterior dorsal shield* of moderate length and rather wide at the anterior end but

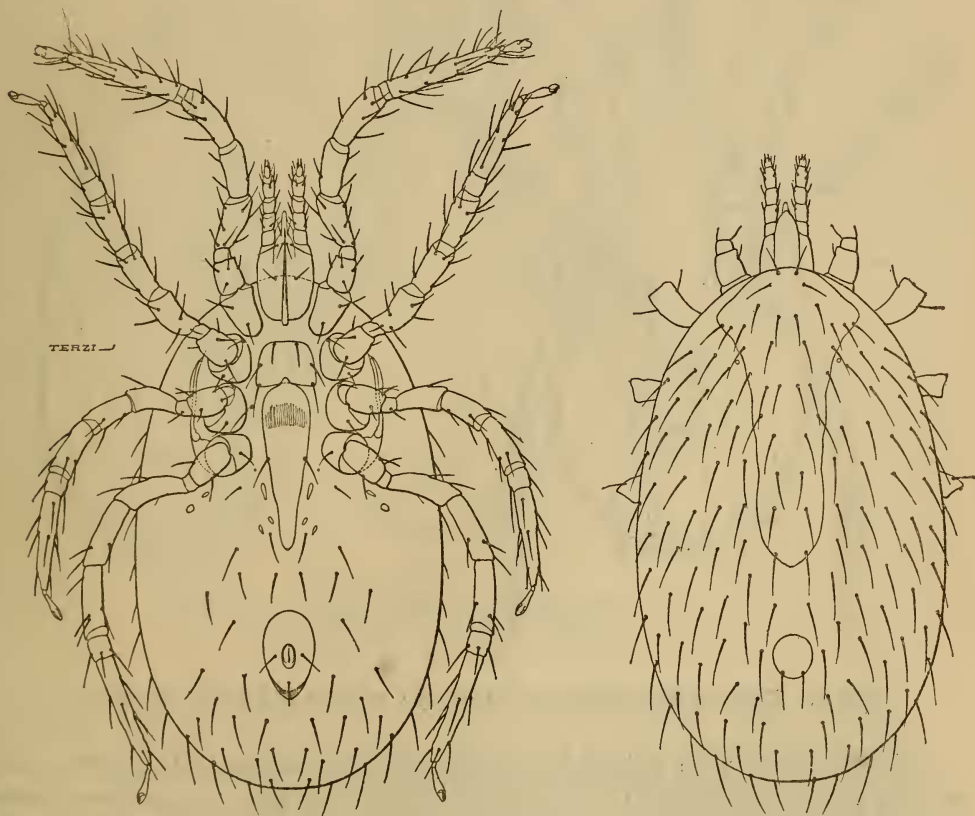


Fig. 5. *Dermanyssus sanguineus*, ♀; ventral and dorsal aspects.

narrower posteriorly, ending abruptly, the posterior extremity being fairly wide and somewhat rounded; hairs on this shield fairly long. *Posterior dorsal shield* almost ovate in shape and always furnished with a pair of fairly long hairs. *Sternal plate*

practically trapezoidal in shape; although considerably wider than long, its length is much greater as compared with the width than is the case in *D. aegyptius*; there are three pairs of hairs on its surface. *Genito-ventral plate* narrow and long, extending backwards far beyond the last coxae. There are three inconspicuous platelets on each side of this plate, those of the anterior pair being elongated. *Anal plate* long oval in shape, as in *D. aegyptius*. Two minute platelets are present posterior to (and somewhat to the side of) each of the coxae of the fourth legs. *Peritreme* extending as far forwards as or slightly beyond the middle of the coxa of the second leg. Anterior surface of coxa of *second leg* without a spur. *Length* of body of distended specimen, 1.4 mm.

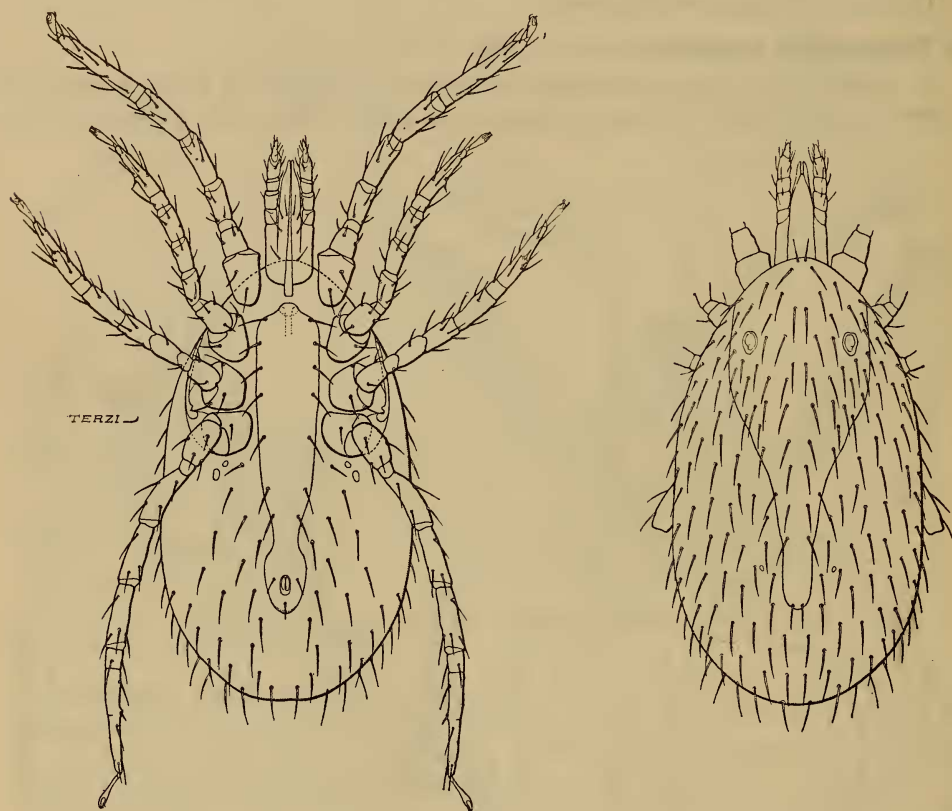


Fig. 6. *Dermanyssus sanguineus*, Hirst, ♂; ventral and dorsal aspects.

♂. *Dorsal shield* wide anteriorly but progressively narrowed posteriorly, the terminal part of it being quite narrow and the extreme end blunt; a number of hairs of moderate length are present on this shield, including a pair at the posterior end. A pair of structures somewhat resembling the eye-like structures of *D. muris* are present in the same position on the dorsal shield, but they are irregular in shape and much less conspicuous. *Sterno-ventral plate* with the sides not so straight as in *D. muris*, and narrowed so as to form a distinct neck in front of the slightly

enlarged anal portion; eight pairs of hairs and the usual unpaired posterior hair are present on this plate. *Peritreme* rather short, apparently not reaching as far forwards as the middle of the second coxa (?), but its supporting plate proceeds a little further forwards. Tarsi of third and fourth legs long and slender; the conical projection on their ventral surface is situated in practically the same position as in *D. muris*. *Chelicera* closely resembling that of *D. muris*, a long accessory flagellum being present. *Length* of body, .7 mm.

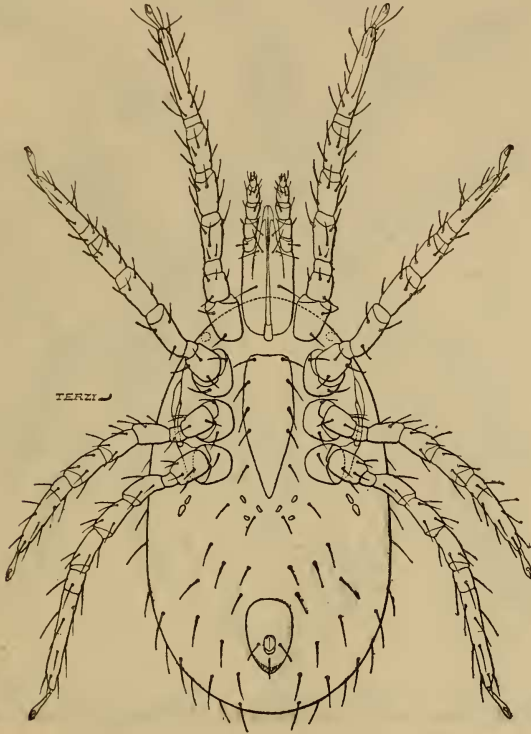


Fig. 7. Ventral view of deutonymph of *Dermanyssus sanguineus*, Hirst.

Deutonymph. *Dorsal shields* very similar to those of the female. A small circular or sub-circular platelet is situated above the interval between the first and second legs. *Sternal plate* projecting backwards well beyond the last coxae and its end rather sharply pointed; it has four pairs of hairs on it. Immediately behind the sternal plate, there are three pairs of very minute and inconspicuous platelets. A pair of platelets placed close together are also present just behind each of the last coxae. *Peritreme* short, the tubular part of it, apparently, only reaching a little in front of the third coxa, but it is continued forwards by its chitinous shield, which almost reaches the middle of the second coxa. *Length* of body, .7 mm.

Protonymph. Principal dorsal shield very like that of the same stage of *D. muris*. Four pairs of minute lateral platelets very similar in appearance to those present in *D. muris* can also be made out, but the posterior ones are very minute and difficult to see. The small posterior shield bearing two hairs is not quite so elongated as in the female or deutonymph. Sternal shield about as long as that of the protonymph of *D. muris*, but with only three pairs of hairs. Peritreme very short. Length of body, .52 mm.

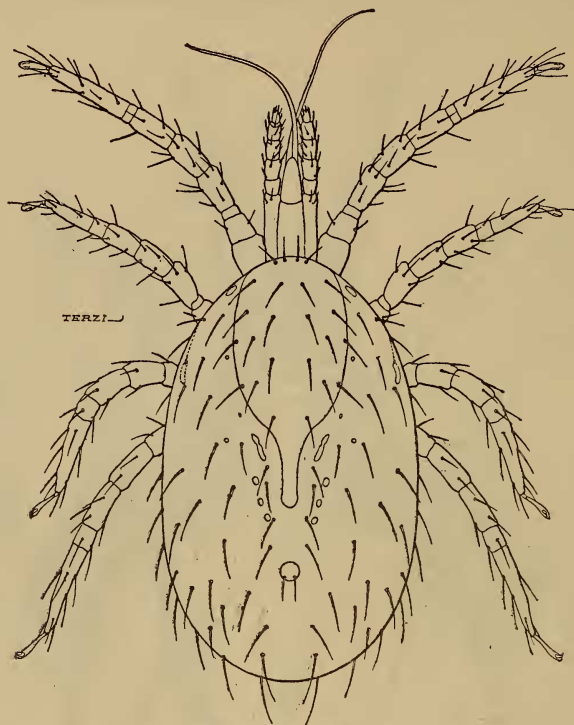


Fig. 8. Dorsal view of protonymph of *Dermanyssus sanguineus*, Hirst.

EGYPT: Assiût: (1) Numerous specimens found on *Mus rattus* in the town and a few on the same host on the feluccas there; (2) ten specimens from *Arvicanthis niloticus* (in houses); (3) one specimen from *Acomys cahirinus*. El Hasaiba, Deirût; twelve specimens from *Mus rattus*. Kous; three specimens from *Mus rattus*.

3. *Dermanyssus aegyptius*, Hirst (figs. 9–11).

Dermanyssus (*Liponyssoides*) *aegyptius*, Hirst, Bull. Ent. Res. iv, p. 122 (1913).

♀. Two shields are present on the dorsal surface as in *D. sanguineus*, sp. n., but the posterior one is minute and inconspicuous. Anterior dorsal shield long and narrow; posteriorly it is very much reduced in width, being practically linear (this part of the scutum is shown a little too wide in fig. 9), but the extreme end is very slightly enlarged again; hairs on this shield fairly long. Two minute and very narrow

(linear) platelets can sometimes be distinguished on each side of this shield, but they are difficult to see. *Posterior dorsal shield* minute and without any hairs on its surface; its outline presents a close resemblance to a butterfly, four lobes or wings being visible. *Sternal plate* very much wider than long and with only two pairs of hairs; immediately behind it, however, there is a pair of small but distinct platelets, each of which bears a very long fine hair similar to those on the sternal plate. *Genito-ventral plate* narrow and long, projecting far beyond the last coxae, and its posterior

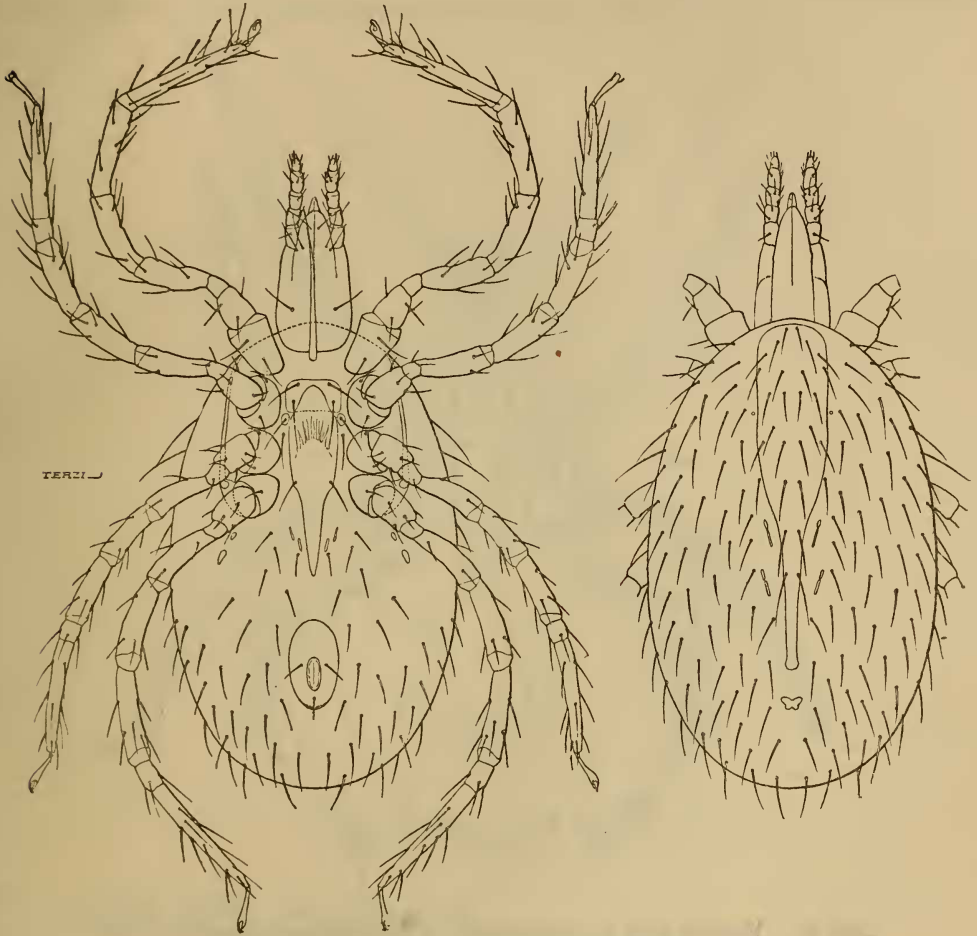


Fig. 9. *Dermanyssus aegyptius*, Hirst, ♀; ventral and dorsal aspects.

end sharply pointed; it is furnished with the usual pair of hairs. On each side of this plate there are two very narrow elongated platelets as in *D. muris*, but they are very inconspicuous. There is also a pair of platelets behind each of the coxae of the last pair of legs. *Anal plate* long oval in shape. *Peritreme* extending about as far forwards as the middle of the coxa of the second leg. *Legs* more slender than is the case in *D. muris*. Anterior surface of coxa of second leg without a spur. *Length* of body (gorged specimen), 1.9 mm.

Deutonymph. *Dorsal shields* both closely resembling those of the female. Two or three platelets are situated on each side of the anterior shield. A small but distinct platelet is placed above the interval between the first and second legs and it is narrow and elongated instead of being oval as in the deutonymph of *D. muris*. *Sternal plate* projecting backwards distinctly beyond the last coxae; three pairs of hairs are present on it. *Peritreme* rather short, and apparently not reaching as far as the middle of the second coxa. *Length* of body, 1.1 mm.

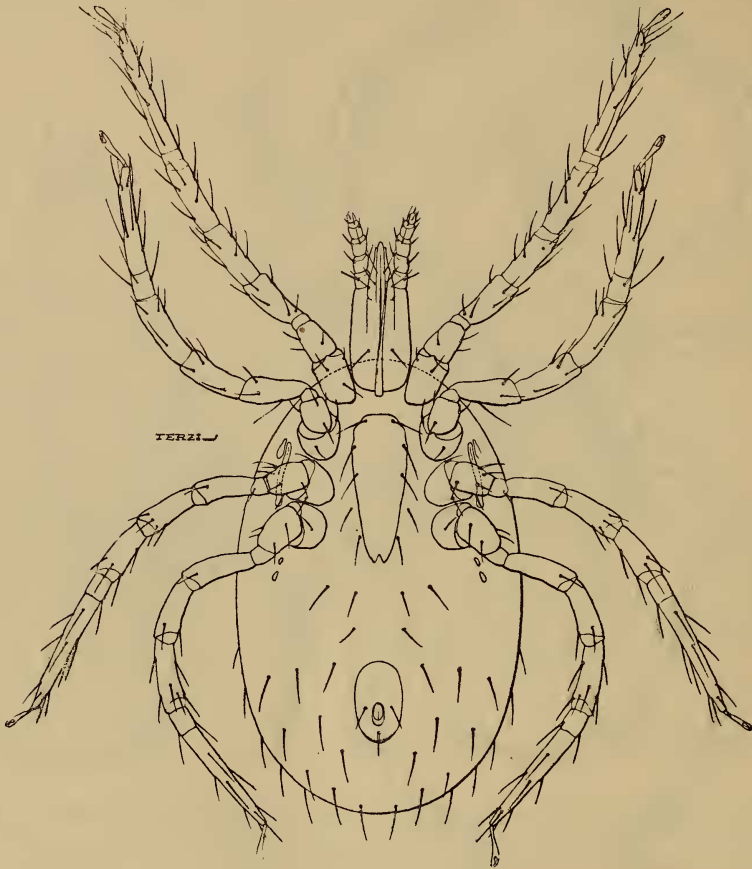


Fig. 10. Ventral view of deutonymph of *Dermanyssus aegyptius*, Hirst.

Protonymph. *Dorsal shields* very like those of the adult and deutonymph; the posterior tail-like prolongation of the main shield is much narrower than is the case in the protonymphs of *D. muris* and *D. sanguineus*; four minute platelets are situated on each side of this part of the shield, those of the two anterior pairs being elongated, but the posterior ones are oval and they are very minute and inconspicuous. There are two little platelets on the side of the body; the anterior one is situated as in the deutonymph, and the other is in front of the anterior end of the peritreme. *Sternal plate* extending backwards beyond the middle of the last

coxae and furnished with three pairs of hairs. A minute platelet is situated behind each of the coxae of the last pair of legs. *Peritreme* very short. *Length* of body, .61-.7 mm.

EGYPT: Assiût; specimens found on the following hosts:—(1) Over three hundred specimens taken on *Acomys cahirinus* in the town and a few on the feluccas; (2) a large number of specimens on *Mus rattus* in the town and a few on the feluccas; (3) three specimens from *Mus norvegicus* (on feluccas); (4) *Arvicanthis niloticus* (in houses), eight specimens. El Weladie; thirteen specimens (name of host not given). Kous; a few specimens found on *Acomys cahirinus*.

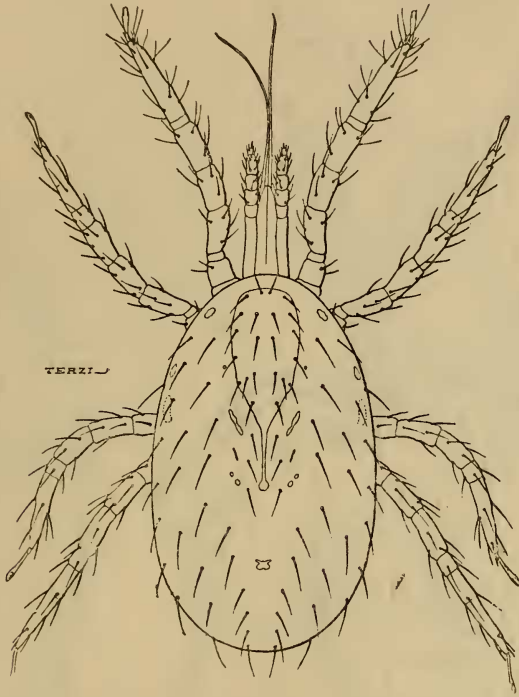


Fig. 11. Dorsal view of protonymph of *Dermanyssus aegyptius*, Hirst.

4. *Leiognathus bacoti*, Hirst (figs. 12-14).

Leiognathus bacoti, Hirst, Bull. Ent. Res. iv, p. 122 (1913).

♀. The original description of the female of this species is fairly complete and therefore only a few additional details are given here:—Two elongated *platelets* are placed symmetrically on each side of the genito-ventral plate. Anterior surface of coxa of first leg with the upper angle projecting and dentiform. Anterior surface of coxa of second leg armed distally with a distinct spine, but, owing to its position, this spine is not always easy to see. *Peritreme* reaching far forwards; its supporting plate ends anteriorly in a lancet-shaped expansion situated on the dorso-lateral surface of the body above the interval between the first and second coxae. (The

tubular part of the peritreme appears to vary in length in mounted preparations of this and other Gamasid mites, but I think that this is merely due to the fact that this tube can only be readily seen for its full length when filled throughout with air.) *Length* of body (distended specimen), .95 mm.

♂. *Dorsal shield* almost as wide and long as the body, but leaving a narrow lateral strip of unprotected integument (except anteriorly); hairs on its dorsal surface rather long and fine; a longitudinal series of paired hairs runs down the middle, those of the last pair being placed close together at the end; there are a few other symmetrically arranged hairs near the middle and also a lateral series. *Sternal plate*

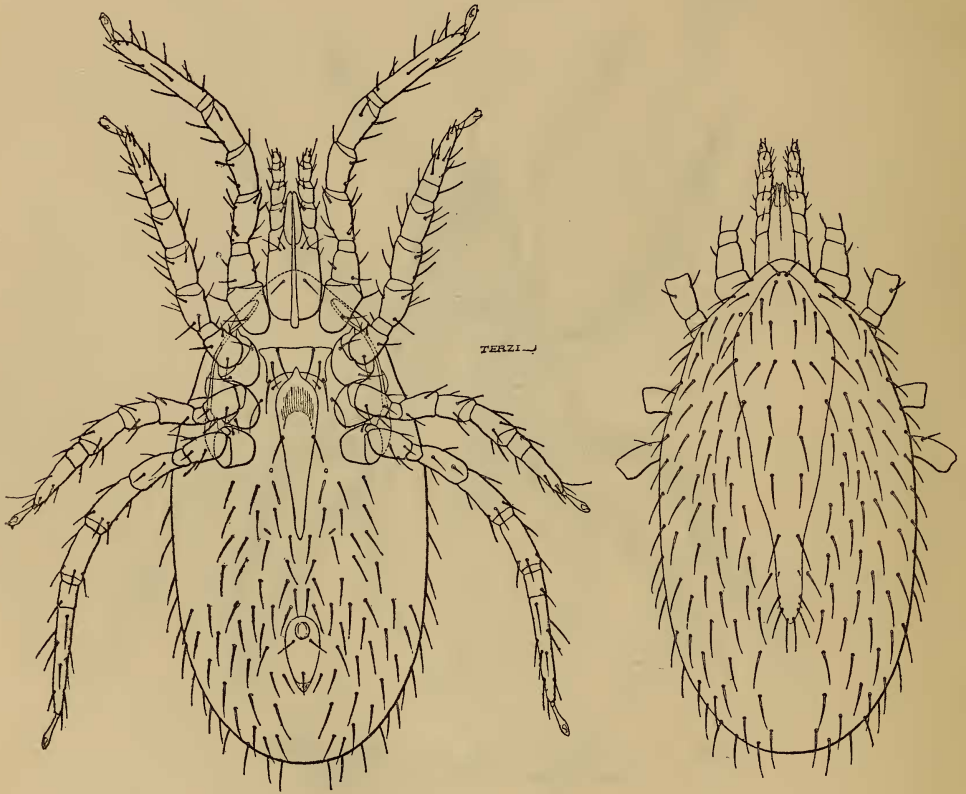


Fig. 12. *Leiognathus bacoti*, Hirst, ♀; ventral and dorsal aspects.

long, narrow, and furnished with eight or nine pairs of long hairs and the usual unpaired posterior hair; it is slightly narrowed before the anal portion. *Peritreme* extending as far forwards as the anterior surface of the coxa of the second leg or somewhat further. Fingers of *chelicera* short and difficult to make out. *Length* of body, .43 mm.

Protonymph. *Anterior dorsal shield* of moderate size and provided with twenty hairs (arranged as shown in fig. 14), all of them being long, except those of the first pair. *Posterior dorsal shield* situated at the extreme end of the body and furnished

with three pairs of long hairs, those of the anterior pair, however, are often considerably shorter than the others; one or two pairs of exceedingly minute and inconspicuous hairs may also be present on this shield, in addition to the long ones. Between these two principal shields there are two pairs of minute *intermediate platelets*, those of the anterior pair being the larger; there are three central pairs of hairs on this unprotected part of the dorsal surface, the first pair being placed between the anterior pair of intermediate platelets; lateral hairs are also present. There is a minute platelet in front of the anterior end of the peritreme and another more

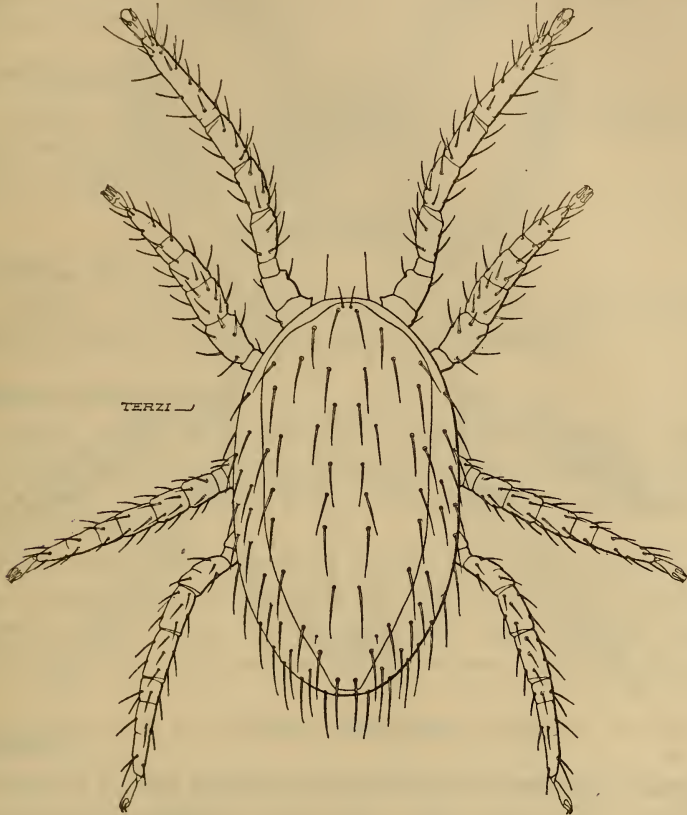


Fig. 13. *Leiognathus bacoti*, Hirst; dorsal view of male.

elongated platelet above the second coxa. *Sternal plate* reaching backwards as far as the anterior surface of the last coxae, or slightly further, and furnished with three pairs of long fine hairs. Anterior end of *anal plate* practically straight. *Peritreme* short and curved. *Length* of body, .4 mm.

The description of the male of *Leiognathus bacoti* is based on Australian specimens, no others being available, but females and nymphs from Egypt, Australia, and South America have been carefully compared with one another; I cannot find any difference between examples from these widely separated localities.

EGYPT: Assiût town (on *Mus norvegicus*, *M. rattus* and *Acomys cahirinus*); and also on the feluccas at Assiût on the same hosts; most of the specimens were found on *Mus norvegicus*, which is apparently the principal host of this parasite.

ABYSSINIA: Harar; numerous specimens collected by G. Kristensen on *Mus* sp., 2. i. 1912, and presented to the British Museum by the Hon. N. Charles Rothschild.

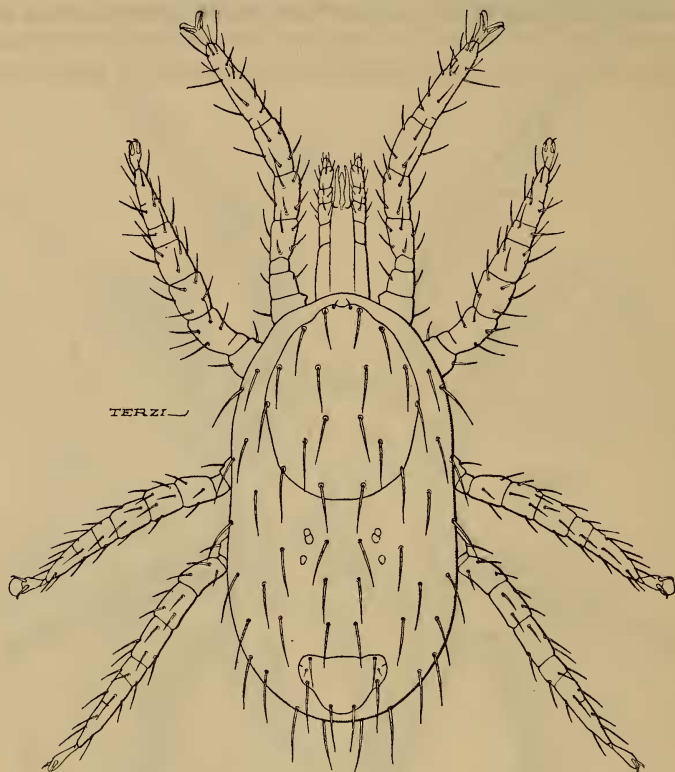


Fig. 14. *Leioognathus bacoti*, Hirst; dorsal view of protonymph.

AUSTRALIA: (1) Specimens found on human beings and on the walls in a boot factory at Sydney, New South Wales; also others found in a rat's nest in the same factory. (2) Specimens found on walls of a seed shop at Sydney (biting human beings) and on a rat caught in this shop; the mites attacked the workers in these establishments, setting up very considerable irritation of the skin. (3) Specimens found on human beings at Perth, Western Australia, 2. xii. 1908. (4) Specimens biting at night on the wharves, Fremantle, Western Australia. All these Australian examples of this mite were sent to the Museum (except those from Perth, which were sent to the Quick Laboratory, Cambridge) by Dr. J. Burton Cleland; my best thanks are due to him for his kindness in sending me these specimens for examination.

SOUTH AMERICA: Numerous examples found by Dr. E. Giacomelli on a rat at La Rioja, Argentine, March 1912; presented to the British Museum by the Hon. N. Charles Rothschild.

Leiognathus bacoti is apparently closely allied to *L. saurorum*, Oudms., and to *L. musculus*, C. L. Koch. The female of *L. saurorum* has its dorsal shield shaped very like that of *L. bacoti*, but the hairs on it are differently arranged, only a single pair of short hairs being present near the posterior end of the shield, instead of several rather long pairs as in *L. bacoti*. The protonymph of *L. musculus* (as figured by Oudemans, Tijdschr. Nederland. Dierk. Ver. (2) vii, pl. 8, figs. 19 and 20, etc., 1902) presents a very close resemblance to that stage of *L. bacoti*, especially as regards the shape of the little posterior dorsal shield and the number of hairs on it; the female of *L. musculus* is very different, however, from that of *L. bacoti*, being furnished with two dorsal shields instead of one.

5. *Laelaps echidninus*, Berl.

EGYPT: Assiût; thirty-two specimens captured on *Mus norvegicus* and three on *Mus rattus alexandrinus* on the feluccas.

This species is probably cosmopolitan.

Family ARGASIDAE.

6. *Argus persicus*, Fischer.

EGYPT: Assiût; a nymph and two larvae found on *Mus rattus*, and two distended larvae found on *Arvicanthis niloticus* (in houses).

7. *Ornithodoros erraticus*, Lucas.

EGYPT: Assiût; about fifty specimens (nymphs and larvae) found on *Mus rattus*, and a nymph and a larva from the same host on the feluccas; three nymphs and six larvae from *Arvicanthis niloticus*. El Hasaiba, Deirût; three nymphs and one larva from *Mus rattus*.

The specimens listed above seemingly belong to *Ornithodoros erraticus*. There are no lateral expansions to the camerostome, but the body has a projection above the mouth-parts as in *O. talaje* var. *capensis*, Nn. Dorsal surface furnished with numerous distinct but very fine granules; discs obsolete or absent. Eyes apparently absent.

Family IXODIDAE.

8. *Rhipicephalus* sp.

EGYPT: Assiût; a large number of nymphs and larvae from *Acomys cahirinus* and also fifteen from *Mus rattus*.